

What is claimed is:

1. A tool insert for cutting on an automatic lathe, wherein the tool insert is adapted for attachment by a threaded fastener to a tool shank having a tool-supporting end defining a first tool-supporting surface, a second tool-supporting surface oriented at an acute angle relative to the first tool supporting surface and forming a tool recess between the first and second tool-supporting surfaces for receiving and supporting the tool insert, wherein the tool-supporting end of the shank further defines an elongated body portion formed between the second tool-supporting surface and an adjacent side of the tool-supporting end of the shank, and the elongated body portion defines a maximum thickness of at least approximately 1.0 mm, and wherein the maximum width of the portion of the shank extending between an outer end of the first tool-supporting surface and the opposite side of the elongated body portion is less than approximately 9 mm; said tool insert comprising:

four sides defining an approximately rhomboidal shape, wherein the insert defines an inscribed circle having a diameter less than approximately 90% of said maximum width of the portion of the shank extending between the outer end of the first tool-supporting surface and the opposite side of the elongated body portion of the tool-supporting end of the shank, and a fastener aperture extending through the approximate center of the inscribed circle having a diameter less than approximately 70% of the diameter of the inscribed circle, and wherein the rhomboidal-shaped insert is receivable within the tool recess of the tool-

30 supporting end of the shank with two sides of the insert each engaging a respective tool-supporting surface of the shank and a substantial portion of the other two sides of the insert extending outwardly from the shank and forming a cutting tip for cutting a workpiece.

2. A tool insert as defined in claim 1, wherein the two sides of the insert engageable with the tool-supporting surfaces of the shank are oriented at an angle of approximately 35° relative to each other.

Sub A1
~~3. A tool insert as defined in claim 1, wherein the two sides of the insert which extend beyond the end of the shank are oriented at an angle of approximately 35° relative to each other.~~

4. A tool insert as defined in claim 1, wherein the inscribed circle has a diameter within the range of approximately 5.5 mm through 6.5 mm.

5. A tool insert as defined in claim 1, in combination with:

5 a tool shank defining a rectangular cross-sectional shape and having a maximum width of less than approximately 9 mm, and including a tool recess defined at one end of the shank by two tool-supporting surfaces oriented at an acute angle relative to each other for receiving and supporting the tool insert, wherein one of the tool-supporting surfaces is oriented approximately parallel to an adjacent side of the shank forming an elongated
10 body portion between the tool recess and the respective side of the shank and having a thickness of at least approximately 1.0 mm; and

15 a threaded fastener extending through the fastener aperture and threadedly attached to the tool shank for fixedly attaching the tool insert to the tool shank, the threaded fastener defining a head having a maximum diameter less than approximately 70% of the diameter of the inscribed circle.

6. A tool insert in combination with a tool shank and fastener as defined in claim 5, wherein the first and second tool-supporting surfaces of the shank are oriented at an angle of approximately 35° relative to each other.

7. A tool insert in combination with a tool shank and fastener as defined in claim 5, wherein the tool shank defines a square cross-sectional shape having a width of either 7 mm or 8 mm.

8. A tool insert in combination with a tool shank and fastener as defined in claim 5, wherein the inscribed circle has a diameter within the range of approximately 5.5 mm through 6.5 mm and the maximum shank width is within the range of approximately 7 mm through 8 mm.

9. A tool insert in combination with a tool shank and fastener as defined in claim 5, wherein the maximum shank width is within the range of approximately 7 mm through 8 mm and the maximum head diameter of the threaded fastener is within the range of approximately 3 mm through 4.5 mm.

10. A tool insert in combination with a tool shank and fastener as defined in claim 5, wherein the threaded fastener is a counter-sunk screw defining a counter-sink angle within the range of approximately 52° through 68°.

11. A tool insert in combination with a tool shank and fastener as defined in claim 10, wherein the counter-sink angle of the threaded fastener is 60°.

Sub A2

12. A tool insert as defined in claim 1, in combination with:

5 a tool shank including a first tool recess formed within a first tool-supporting region located on one side of a tool-supporting end of the shank, and a second tool recess formed within a second tool-supporting region located opposite the first tool-supporting region, wherein each tool recess is defined by a first tool-supporting surface and a second tool supporting surface spaced apart from, and oriented at an acute angle relative to the respective first tool-supporting surface, and each tool recess is adapted to receive and support a respective tool insert between its first and second tool-supporting surfaces; and wherein each tool-supporting region further includes an elongated body portion formed between the respective second tool-supporting surface and an adjacent side of the tool-supporting end of the shank, and each elongated body portion defines a maximum width of at least approximately 1.0 mm; and wherein the maximum width of each tool-supporting region of the shank extending between an outer end of the respective first tool-supporting surface and the opposite side of the respective elongated body portion is less than approximately 9 mm.

13. A tool insert in combination with a tool shank as defined in claim 12, comprising two of said inserts, each being fixedly secured by a respective fastener within a respective tool recess.

14. A tool insert in combination with a tool shank as defined in claim 13, wherein each of said inserts is configured to perform a different one of a plurality of different machining operations relative to the other, and the plurality of machining operations are selected from the group including: grooving, plunge and turn, threading, front turn, back turn and cut off.

15. A tool insert in combination with a tool shank as defined in claim 13, wherein the two inserts are positioned approximately 180° apart from each other, and each insert defines a cutting edge aligned with the centerline of the shank.

16. A tool insert in combination with a tool shank as defined in claim 12, wherein the shank defines an approximately circular cross-sectional configuration for mounting in a gang-tool holder of a gang-tool lathe.

aaaa3